

Case report

## Entire Removal of Screw-In Pacing Leads 3 Years after Implantation

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### Abstract

**Objective:** To report that screw-in type pacing leads can be removed by screw retraction even after a significant anchoring period.

**Patient:** A 78-year-old woman who visited our hospital for skin erosion over a pacemaker that had been implanted 3 years previously and had migrated from the subclavicular area to the axilla.

**Methods:** Culture revealed a local staphylococcus infection. We placed a new pacemaker system in the contralateral (right) side, removed the old one, inserted a straight type stylet into the leads, and turned the rotator counterclockwise.

**Results:** An image monitor confirmed complete retraction of the ventricular lead screw and partial retraction of the atrial lead screw, and we were able to pull out both leads without any resistance. The patient was given antibiotics and discharged 2 days after the surgery. No wound infection was evident at a 3-month follow-up examination.

**Conclusion:** When a screw-in type pacemaker with a retractor must be removed long after its implantation, screw retraction should be tried before resorting to a removal kit or open heart surgery.

**Key words:** pacemaker, infection, pacemaker lead

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### Introduction

The breakdown of a pacemaker pocket is a serious problem because it can lead to infection and sometimes to infectious endocarditis<sup>1)</sup>. Ideally, the entire anchored leads, which could become infected, should be removed<sup>2,4)</sup>.

We report here case of breakdown of a 3-year-old pacemaker pocket that had become infected with staphylococcus. We implanted a new pacemaker system in the subclavicular area on the contralateral (right) side and then removed the old one and its leads. Initially, we planned to remove

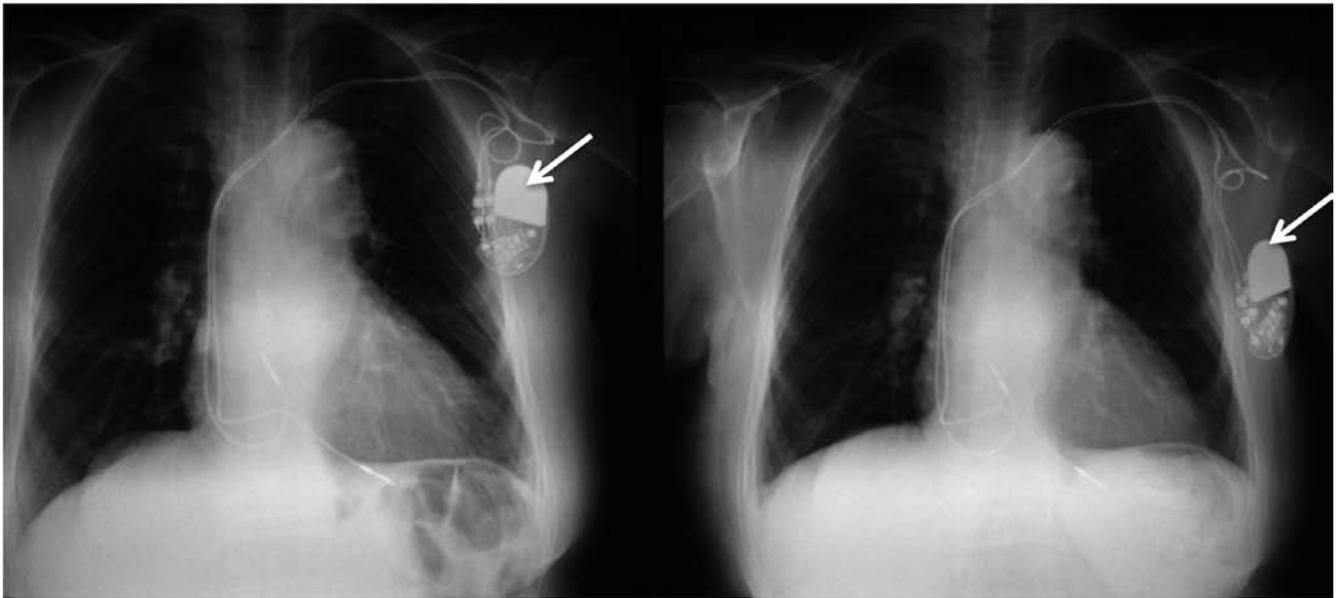
as much of the old leads as possible and affix the stumps to a rib. The old leads were the screw-in type with retractors, and we were able to remove them with ease. We inserted a straight type stylet into each lead and turned the rotator counterclockwise. The screw was successfully retracted, and both the atrial and ventricular leads were entirely removed.

### Patient and Methods

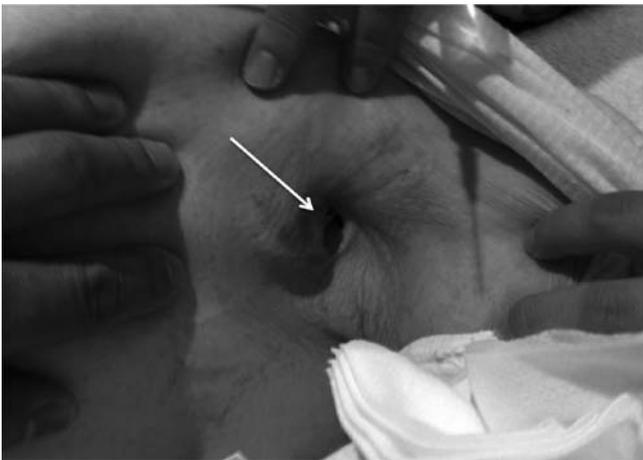
A 78-year-old Japanese woman visited our department for left axillary pain and an associated skin wound with a yellow discharge. Three years ago, she had undergone pacemaker surgery (DDD, Identity SJM, Tendril lead 1488 7Fr, 52 and 46 cm) for complete atrio-ventricular blocks, according to our routine procedure<sup>5)</sup> (cut down, screw-in type lead, subpectoral pocket; Figure 1). Her pacemaker had migrated from the left subclavicular area to the axilla, and the covering skin was thin and partially broken (Figure 2). Swab samples taken from the surface of the pacemaker were positive for *Staphylococcus aureus*, but there was no sign of systemic infection. The wound was irrigated with sterile saline until surgery, and the patient was given oral sulfamethoxazole and trimethoprim.

Because *S. aureus* is highly pathogenic, we implanted a new system 5 days after admission, this time using the right subclavicular area. Again, we applied our routine technique—cut-down of the cephalic vein, use of a screw-in type lead (SJM, Zephyr, Tendril 2088 6Fr, 46 cm and 46 cm), and implantation under the major pectoral muscle. To prevent migration, we affixed the new generator to a rib with 2-0 silk. After closing the wound, we set up the new pacemaker in DDD mode at 60-110 beats/min. We shielded the right subclavicular wound securely and disinfected the left subclavicular area and chest wall. We then made a small incision into the old surgical scar, detached the infected pacemaker, pulled out both leads, carefully dissected adhesions between the leads and the pocket, and inserted a stylet into each lead. At only proximal site of the leads, just close to the

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**Figure 1** Chest x-ray taken 3 years ago (left) and on current admission. White arrows point to the generator, which migrated from the subclavicular area to the axilla.



**Figure 2** The white arrow points to skin erosion over the generator at the axilla.

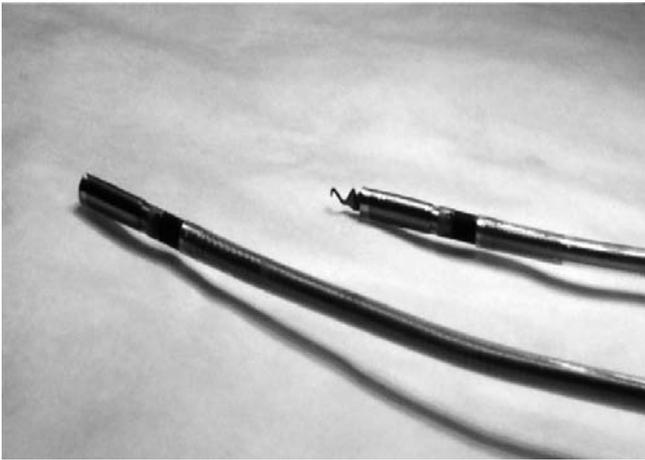
connector, the coating materials of the leads were discolored. We attached a rotator at each proximal end and turned it counterclockwise. Using x-ray monitoring, which indicated complete retraction of the ventricular lead and a remaining screw of the atrial lead, we pulled gently and removed both leads, encountering no resistance (Figure 3). We irrigated the wounds with saline and closed them in layers. The patient recovered, was given antibiotics and was discharged 2 days after the surgery. The wound had healed by the time of a

6-month follow-up examination, and no infection was evident.

## Discussion

Pacemaker infection is a serious problem that is usually treated by implantation of a new system on the contralateral side followed by removal of the old one, which includes cutting off as much of the proximal leads as possible<sup>6</sup>). When enough of the leads cannot be removed to control infection, use of a removal kit or open heart surgery must be considered<sup>1</sup>). In Japan, the health insurance system does not cover removal kits, and the success rate is only about 80%<sup>2,3</sup>). Open heart surgery is a possibility but may be too invasive, especially for older patients.

In our hospital, to achieve day surgery or admission for only 1 night, we use a screw-in lead, lead insertion with a cut-down technique and a subpectoral pocket<sup>5</sup>). The screw-in lead is effective for preventing dislodgement, and we have not encountered a single case of its failure in the more than 200 consecutive cases we have managed over the past 5 years. Here, we report a newly discovered advantage of a screw-in lead. If it is retractable, there is a chance of its total removal without a more invasive procedure. We experienced a case of an infected pacemaker during past 5 years and removed an infected lead with same technique, but the case occurred only 3 months after the initial surgery. The case reported in this manuscript occurred more than 3 years



**Figure 3** Ventricular (left) and atrial pacing leads after removal. The ventricular lead screw was completely retracted, but the final loop of the atrial lead screw remained in the body. Note the stretched screw and small amount of heart tissue on it.

after the initial surgery. Usually, it is impossible to remove an entire lead without open heart surgery or the use of a removal kit.

Insertion of a stylet is important for screw retraction. We routinely choose the shortest lead to avoid a redundant lead loop in the pacemaker pocket. Too long a loop leaves unnecessary volume that can delay wound healing and lead to infection<sup>1</sup>. When approaching from the left side, we usually use a 52-cm lead for the ventricle and a 46-cm lead for the atrium. To insert a stylet into the lead, we need to dissect the adhesions occurring between the lead and pocket wall without injuring the lead. It turned out that short leads offered the advantage of needing to dissect only a short distance, which could be done in a short amount of time. In this case, we were able to insert stylets without injuring any of the leads.

Partial retraction of the atrial lead presents a risk of perforation of the heart. Gentle maneuvering is essential, and the procedure must be stopped if resistance is felt. In our case, the lead bodies interfered with each other when we tried to

remove the ventricular lead, but we were able to pull out the atrial lead, whose screw was partially retracted. The reason we could pull out the atrial lead easily was that a most of the screw had already separated from the atrial tissue and only a small amount of heart tissue attached to the tip of the screw (Figure 3) was preventing its complete retraction.

It was necessary to carefully watch both leads at the same time even when concentrating on one of them.

The main cause of our trouble was the generator's migration. The major pectoral muscle makes up the lateral margin of the subpectoral pocket, and the spindle shape of the thoracic cavity mediated the generator's slipping down from the subpectoral space to the axilla. In light of this case, we modified our procedure to include the affixing of the generator to a rib with 2-0 silk and the secure closing of the lateral margin of the pocket.

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